



Testimony

Before the Subcommittee on Aviation, Committee on
Transportation and Infrastructure, House of
Representatives

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AIR TRAFFIC CONTROL

Status of FAA's Implementation of the Display System Replacement Project

Statement of Gerald L. Dillingham,
Associate Director, Transportation Issues,
Resources, Community, and Economic
Development Division



G A O

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Mr. Chairman and Members of the Subcommittee:

We appreciate the opportunity to provide our observations on the status of the Federal Aviation Administration's (FAA) implementation of the Display System Replacement (DSR) project. DSR, which replaces the controllers' workstations and other equipment in the nation's en route centers,¹ is one of FAA's major projects under the air traffic control modernization program. In 1981, FAA began a multibillion-dollar modernization effort to improve the safety, the capacity, and the efficiency of this system to meet the increasing demand for air traffic services and to replace aging equipment. The agency plans to spend approximately \$41 billion on the modernization effort from fiscal years 1982 through 2004. FAA has historically experienced some major difficulties in delivering modernization projects within cost, schedule, and performance parameters.² However, over the past couple of years, FAA has taken steps to improve its management of the modernization program. In particular, the agency has revised its approach to acquiring new systems by limiting their scope to manageable segments. Continuing with its new approach to modernization is key to allowing FAA to consistently deliver new systems within established goals.

In this context, you asked us to address (1) the status of FAA's overall modernization program, (2) FAA's progress in implementing DSR, with particular emphasis on events surrounding Boston's implementation, and (3) opportunities for continued success by FAA in completing its modernization projects. GAO has a long history of reviewing the modernization program as well as individual projects, and this testimony is based on prior reports and testimonies.³

My testimony today is structured around a series of slides (see app. I). In summary, the slides show the following:

¹En route centers, also called air route traffic control centers, are one of three types of facilities that FAA uses to control air traffic. These facilities control planes in transit and during approaches to some airports. The airspace that most en route centers control extends above 18,000 feet for commercial aircraft. En route centers also handle aircraft at lower altitudes when dealing directly with a control tower.

²Because of the size, the complexity, the cost, and the problem-plagued past of FAA's modernization program, we have designated it a high-risk information technology investment since 1995. It is one of four high-risk system development and modernization efforts. See *High-Risk Series: An Overview* (GAO/HR-95-1, Feb. 1995); *High-Risk Series: Information Management and Technology* (GAO/HR-97-9, Feb. 1997); and *High-Risk Series: An Update* (GAO/HR-99-1, Jan. 1999).

³A list of related GAO products is attached.

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- FAA's revised approach to modernization—acquiring new systems by using a more incremental approach as opposed to its prior practice of tackling large, complex projects all at once—appears to be paying dividends. DSR, which evolved from FAA's restructuring of the Advanced Automation System,⁴ reflects this incremental approach. With DSR, FAA has concentrated on replacing the controllers' workstations and other supporting equipment and plans to add new functions and capabilities later.⁵ With the former project, FAA had attempted to do both—replace old equipment and add new functions concurrently. Another aspect of the new modernization approach involves working actively with the aviation community to make decisions more collaboratively, as opposed to unilaterally making decisions about air traffic control modernization. FAA's decision to revise the schedule for implementing DSR at some facilities to minimize potential impacts on service, after collaborating with the aviation industry, is a positive example.
 - FAA has achieved a more successful implementation of DSR than other aspects of its modernization program. FAA developed DSR within its estimated cost and schedule milestones. Nationwide, DSR has been delivered to all of the facilities that were scheduled to receive it, and FAA is in various stages of testing and using it. One of these facilities (Boston) is expected to begin using DSR in a limited capacity next week and should begin full operations in January 2000. One lesson learned from the earlier implementation of DSR at en route facilities is that the transition to the new equipment, coupled with other factors, had an impact on FAA's delivery of air traffic services. For example, FAA managers at some facilities added extra distance between aircraft (known as miles-in-trail) while controllers were becoming familiar with the new equipment. The extra distance, coupled with severe weather and other factors, contributed to delays. FAA has since modified its procedures, including revising the dates for Boston's limited use of the equipment, to reduce the potential impacts associated with the transition.
 - FAA has an opportunity to replicate its success with DSR on other modernization projects that are underway and with future efforts.

⁴Advanced Automation System, the one-time centerpiece of the modernization program, was designed to replace the computer hardware and software, including workstations, used by controllers in air traffic control facilities. Numerous problems during development led FAA to restructure the project in 1994.

⁵One such capability already planned is the User Request Evaluation Tool, which is a "conflict probe." This tool will provide controllers with a 20-minute "look ahead" to detect potential conflicts when considering pilots' requests for altitude or route changes. Detection of potential conflicts early will help improve system safety and allow pilots to fly preferred routes that will save the airlines time and fuel costs.

However, it will be very important for the agency to continue to incorporate the factors contributing to DSR's success, namely (1) using an incremental approach to modernization, (2) collaborating with internal users (controllers and maintenance technicians) and with external users (airline industry), and (3) implementing recommendations to improve the modernization program. FAA has begun to take actions to develop a complete systems architecture to guide modernization, improve its investment management approach, develop mature software acquisition capabilities, and change its organizational culture. As we have discussed in our previous reports, shortcomings in these areas have led to problems in the past. While FAA's efforts to correct these shortcomings are encouraging, more remains to be done. Additionally, as FAA embarks on full implementation of DSR and other planned equipment upgrades to improve safety and efficiency, it will be important for the agency to continue to monitor efficiency measures to determine if the changes that have been implemented are having the intended effect of minimizing impacts on service.

Contact and Acknowledgement

For additional information about this testimony, please contact Gerald Dillingham at (202) 512-2834. Individuals making major contributions to this testimony include Danielle Bartoni, Pete Maristch, John Noto, and Belva Martin.

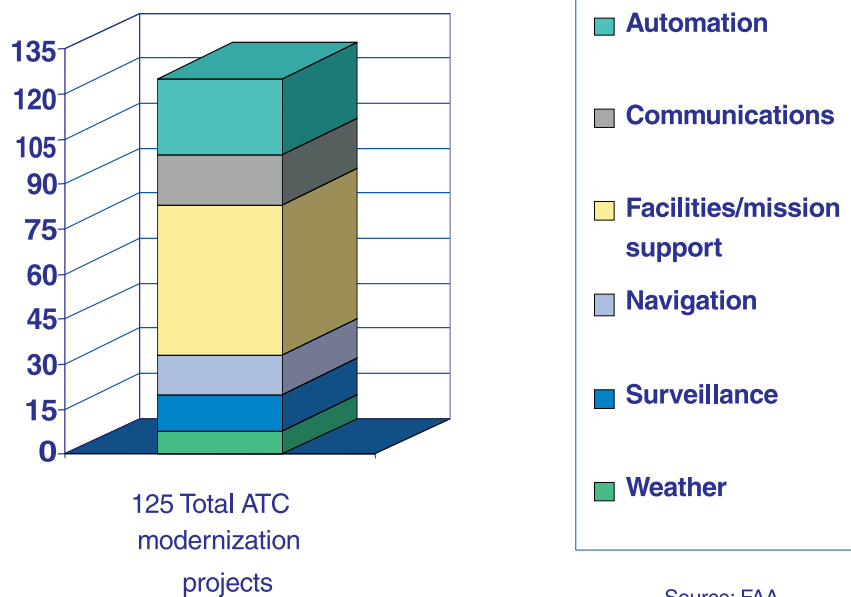
Objectives

This testimony will discuss

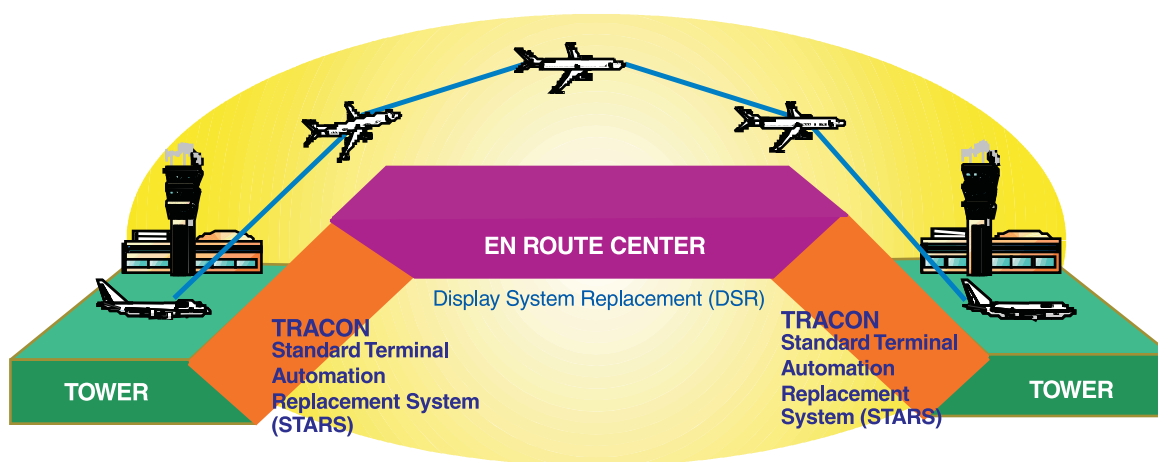
- The status of FAA's Air Traffic Control (ATC) modernization program
- FAA's progress in implementing the Display System Replacement (DSR) equipment
- Opportunities for continued success by FAA in completing its modernization projects

Status of ATC Modernization

The total ATC modernization program is estimated to cost \$41 billion from fiscal years 1982 through 2004 and currently consists of about 125 ongoing projects.



Status of ATC Modernization Profile of FAA's Air Traffic Services



Status of ATC Modernization FAA's Restructured Automation Program

Previous "Big Bang" Approach

- One contractor to meet all automation needs
- Specially designed equipment
- Requirements change without regard to cost and schedule



Restructured "Incremental" Approach

- Uses multiple contractors for automation needs
- Procures commercial equipment
- Holds the line on changes to requirements

FAA's Progress in Implementing DSR Project

- Replaces 20- to 30-year-old en route equipment, including the controllers' workstations and monitors and the network's infrastructure.
- Provides a platform for FAA to implement other enhancements to improve safety and provide user benefits.

✓ **Delivered within cost and schedule**

FAA's Progress in Implementing DSR Project Nationwide



- ✓ All 20 en route sites have received equipment.
- ✓ 9 sites are fully operational.

FAA expects the remaining 11 sites to be fully operational by May 2000.

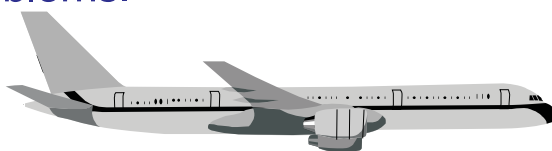
DSR Implementation at Boston Is Under Way

Timeline of DSR Implementation at Boston

2000	January	- Fully operational
	October	- Limited operations
	June	- Testing of DSR equipment completed
1999	December	- DSR equipment received
1998		

Opportunities to Continue Modernization Success

- FAA has an opportunity to consistently deliver new equipment within established goals by continuing with its
 - (1) phased approach,
 - (2) collaboration with the airlines and other users, and
 - (3) efforts to address root causes of past modernization problems.



Related GAO Products

Aviation Acquisition: A Comprehensive Strategy Is Needed for Cultural Change at FAA (GAO/RCED-96-159, Aug. 22, 1996) and Air Traffic Control: FAA's Modernization Investment Management Approach Could Be Strengthened (GAO/RCED/AIMD-99-88, Apr. 30, 1999).

Air Traffic Control: Observations on FAA's Air Traffic Control Modernization Program (GAO/T-RCED/AIMD-99-137, Mar. 25, 1999).

Air Traffic Control: Status of FAA's Modernization Program (GAO/RCED-99-25, Dec. 3, 1998).

Air Traffic Control: Evolution and Status of FAA's Automation Program (GAO/T-RCED/AIMD-98-85, Mar. 5, 1998).

Air Traffic Control: Observations on FAA's Modernization Program (GAO/T-RCED/AIMD-98-93, Feb. 26, 1998).

Air Traffic Control: Immature Software Acquisition Processes Increase FAA Systems Acquisition Risks (GAO/AIMD-97-47, Mar. 21, 1997).

Air Traffic Control: Complete and Enforced Architecture Needed for FAA Systems Modernization (GAO/AIMD-97-30, Feb. 3, 1997).

Air Traffic Control: Improved Cost Information Needed to Make Billion-Dollar Modernization Investment Decisions (GAO/AIMD-97-20, Jan. 22, 1997).

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